DETAILED ACTION

Priority

Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-2 and 6-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hosokawa et al. (JP 2000-068057) in view of Hosokawa et al. (US 5,891,554).

Regarding claim 1, Hosokawa (JP) discloses an organic electroluminescent device in figure 4 comprising a pair of electrodes (items 71 and 72), and at least two organic emitting layers (items 83 and 84) held between the pair of electrodes, the two organic emitting layers both comprising an electron-transporting emitting material (paragraph 130), but does not expressly disclose that two organic emitting layers being arranged with an electron barrier layer interposed therebetween, as claimed by Applicant. Hosokawa (US) is cited to show an organic electroluminescent device with an electron barrier layer disposed in the device. Hosokawa (US) teaches that the electron barrier layer holds electrons in the light emitting region (column 19, lines 51-54).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Hosokawa's invention (JP) to include two organic emitting layers being arranged with an electron barrier layer interposed therebetween as suggested by Hosokawa (US) for holding electrons in the light emitting region.

Regarding claim 2, the combined reference of Hosokawa and Hosokawa disclose the organic electroluminescent device according to claim 1, wherein the two organic emitting layers both have an electron mobility of 10.sup.-6 cm.sup.2/Vsec or more (Hosokawa (JP); paragraph 107).

Regarding claim 6, the combined reference of Hosokawa and Hosokawa disclose the organic electroluminescent device according to claim 1, wherein the organic emitting layer arranged on an anode side relative to the electron barrier layer emits blue light (Hosokawa (JP); paragraph 18).

Regarding claim 7, the combined reference of Hosokawa and Hosokawa disclose the organic electroluminescent device according to claim 6, wherein the organic emitting layer arranged on a cathode side relative to the electron barrier layer emits yellow to red light (Hosokawa (JP); paragraph 133).

Regarding claim 8, the combined reference of Hosokawa and Hosokawa disclose the organic electroluminescent device according to claim 1, but do not expressly disclose that the organic emitting layer arranged on an anode side relative to the electron barrier layer emits yellow to red light, as claimed by Applicant. Hosokawa (JP) does disclose though that the organic emitting layer arranged on the cathode side emits yellow to red light (paragraph 133). It would have been obvious to one having ordinary skill in the art at the time the invention was

made to have the organic emitting layer arranged on an anode side relative to the electron barrier layer emits yellow to red light, since it has been held that rearranging parts of an invention involves only routine skill in the art.

Regarding claim 9, the combined reference of Hosokawa and Hosokawa disclose the organic electroluminescent device according to claim 8, but do not expressly disclose that the organic emitting layer arranged on a cathode side relative to the electron barrier layer emits blue light, as claimed by Applicant. Hosokawa (JP) does disclose though that the organic emitting layer arranged on the anode side emits blue light (paragraph 18). It would have been obvious to one having ordinary skill in the art at the time the invention was made to have the organic emitting layer arranged on a cathode side relative to the electron barrier layer emits blue light, since it has been held that rearranging parts of an invention involves only routine skill in the art.

Regarding claim 10, the combined reference of Hosokawa and Hosokawa disclose the organic electroluminescent device according to claim 6, wherein the maximum wavelength of the blue light is 450 nm to 500 nm (Hosokawa (JP); paragraph 18). The Examiner notes that blue light inherently emits in the wavelength between 450 to 500 nm.

Regarding claim 11, the combined reference of Hosokawa and Hosokawa disclose the organic electroluminescent device according to claim 7, wherein the maximum wavelength of the yellow to red light is 540 nm to 700 nm (Hosokawa (JP); paragraph 133). The Examiner notes that red light inherently emits in the wavelength between 540 to 700 nm.

Regarding claim 12, the combined reference of Hosokawa and Hosokawa disclose the organic electroluminescent device according to claim 1 that emits white light (Hosokawa (JP); paragraph 15).

Regarding claim 13, the combined reference of Hosokawa and Hosokawa disclose a display comprising the organic electroluminescent device of claim 1 (Hosokawa (JP); see FIG. 1).

Regarding claim 14, the combined reference of Hosokawa and Hosokawa disclose the organic electroluminescent device according to claim 9, wherein the maximum wavelength of the blue light is 450 nm to 500 nm (Hosokawa (JP); paragraph 18). The Examiner notes that blue light inherently emits in the wavelength between 450 to 500 nm.

Regarding claim 15, the combined reference of Hosokawa and Hosokawa disclose the organic electroluminescent device according to claim 8, wherein the maximum wavelength of the yellow to red light is 540 nm to 700 nm (Hosokawa (JP); paragraph 133). The Examiner notes that red light inherently emits in the wavelength between 540 to 700 nm.

Claims 4-5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hosokawa et al. (JP 2000-068057) in view of Hosokawa et al. (US 5,891,554) in further view of Matsuura et al. (US 7,034,339).

Regarding claim 4, the combined reference of Hosokawa and Hosokawa disclose the organic electroluminescent device according to claim 1, but do not expressly disclose that a difference in ionization potential between the electron barrier layer and the organic emitting layer arranged on an anode side relative to the electron barrier layer is 0.2 eV or less, as claimed by Applicant. Matsuura is cited to show an organic electroluminescent device with a difference in ionization potential between an electron barrier layer and an organic emitting layer is 0.2 eV

or less (column 15, line 66 thru column 16, line 3). Matsuura teaches this embodiment will exhibit excellent hole barrier properties (column 15, lines 63-65).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the combined reference of Hosokawa and Hosokawa to include a difference in ionization potential between the electron barrier layer and the organic emitting layer arranged on an anode side relative to the electron barrier layer is 0.2 eV or less as suggested by Matsuura for exhibiting excellent hole barrier properties.

Regarding claim 5, the combined reference of Hosokawa and Hosokawa disclose the organic electroluminescent device according to claim 1, but do not expressly disclose that a difference in ionization potential between the electron barrier layer and the organic emitting layer arranged on a cathode side relative to the electron barrier layer is 0.2 eV or less, s claimed by Applicant. Matsuura is cited to show an organic electroluminescent device with a difference in ionization potential between an electron barrier layer and an organic emitting layer is 0.2 eV or less (column 15, line 66 thru column 16, line 3). Matsuura teaches this embodiment will exhibit excellent hole barrier properties (column 15, lines 63-65).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the combined reference of Hosokawa and Hosokawa to include a difference in ionization potential between the electron barrier layer and the organic emitting layer arranged on a cathode side relative to the electron barrier layer is 0.2 eV or less as suggested by Matsuura for exhibiting excellent hole barrier properties.

Allowable Subject Matter

Claim 3 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Regarding claim 3, the references of the Prior Art of record fails to teach or suggest the combination of the limitations as set forth in claim 3, specifically for the limitation of the electron barrier layer has an affinity level of at least 0.2 eV less than the affinity level of the organic emitting layer arranged on a cathode side relative to the electron barrier layer in combination with other claimed features of the present claimed invention.

Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Natalie K. Walford whose telephone number is (571)-272-6012. The examiner can normally be reached on Monday-Friday, 8 AM - 4:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nimesh Patel can be reached on (571)-272-2457. The fax phone number for the organization where this application or proceeding is assigned is (571)-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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